doi:10.1017/S1431927610054371
Microsc. Microanal. 16 (Suppl 2), 2010

Morphological, Size and Chemical Characterization of Inorganic Atmospheric Particles by Scanning Electron Microscopy with EDS

R. Ramirez Leal[1], H. Esparza Ponce[2], M. Burgos-Hernandez[1] and C. Chavez-Toledo[1]

[1]Centro de Estudios Superiores del Estado de Sonora, Ley Federal del Trabajo Final s/n, Col. Apolo Hermosillo, Sonora, Mexico c.p. 83100
[2]Centro de Investigación en Materiales Avanzados S. C., Miguel de Cervantes # 120, Complejo Industrial Chihuahua; Chihuahua, Chihuahua, Mexico c.p. 31109

The particle size characteristics are important because they have influence on particle dwell time within the atmosphere and on its physical and chemical properties; these properties also have influence on global climate, the environment, and human health. In this context, it is of fundamental importance to understand the origin (natural or anthropogenic) of particles in the atmosphere. Previous studies on aerosols have been focused on their classification based on size, concentration, and chemical composition of whole particle masses; with relatively few details on the size, shape and chemical composition of their individual components, thus the focus of this study. This work is based on samplings collected from January to December 2008 in three atmospheric monitoring stations of the Air Quality Improvement Municipal Program for the City of Hermosillo, Sonora, Mexico. The characterization of individual particles was completed by using SEM combined with EDS (JEOL JSM-5800LV). Specimens were initially processed by separating the collected particles from the filters by means of submersing a 2 cm2 section of each filter into isopropyl alcohol within a test tube for 5 minutes. Then, an aliquot of the suspension was placed over a sample holder and into the SEM. We obtained 132 images of particles, both TSP and PM10, were it shows: 1.- The structure of natural particles can be diverse and they usually present a relativity two dimensional aspect. It is often found that such particles have outlying edges, causing fracture lines of their primitive state. In the case of particles that are very old and highly eroded, the tendency is to conform to lattice shapes. Those arising from the biomass are usually symmetrical and very structured, and multitude of morphologic varieties. The natural mineral particles have a matrix based on silicon, calcium or aluminum. Fig. 1 2.- Anthropogenic particles arising from combustion are characterized, in more cases, by a spherical shape due fundamentally to the melting process that occurs during their formation. However, the vast majority of anthropogenic particles usually present a surface that contains a multitude of hollows that give them a cavernous appearance. The major elements in particles formed by combustion include carbon, aluminum, silicon and sulfur. Fig. 2 The studies by EDS to TSP showed in all monitoring stations, that elements are Al, Ba, Ca, Cl, Cr, Cu, Fe, K, Mg, Si, Ti and Zr. With respect to PM10 in the three stations we found Al, Bi, Ca, Cr, Cu,Fe, K, Mg, Na, Pb, S, Si Given that there is relatively little knowledge on morphology, speciation and size of atmospheric particles, the elements found among the atmospheric particles caught on the TSP and PM10 filters highlight the importance of individual characterization of atmospheric aerosol. This knowledge is

valuable additional information about the possible actions and potential effects that air pollutants, of natural or anthropogenic origins, have within the studied area.

References

[2] J.J. Goldstein et al, Scanning Electrón Microscopy and X-ray Microanálisis, Plenum, New Cork, 1992.

[2] Ramirez-Leal,R., Esparza-Ponce,H and Duarte-Moller,A. 2007. Characterizatioin of inorganic atmospheric particles in air quality program with sem, tem and xas. Revista Mexicana de Fisica 53(3): 102-107.

[2] R. Ramirez-Leal, *Microsc. Microanal.* 15 (Suppl. 2) (2009) 1300-1301.

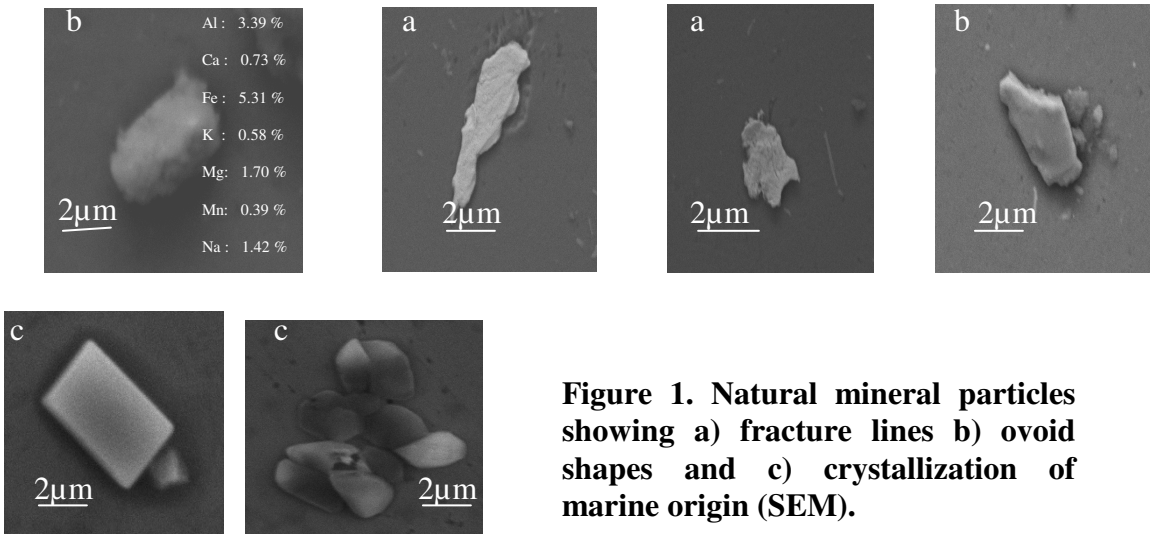

Figure 1. Natural mineral particles showing a) fracture lines b) ovoid shapes and c) crystallization of marine origin (SEM).

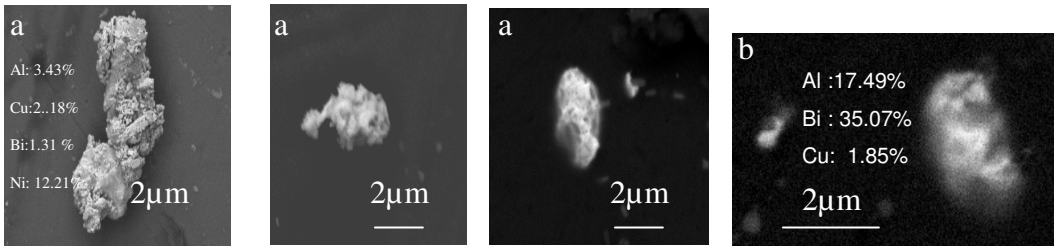

Figure 2. Anthropogenic particles showing a)cavernous particles and b)spherical shape.

https://doi.org/10.1017/S1431927610054371 Published online by Cambridge University Press